

CLAIMS

What is claimed is:

1. An irradiation field limiting device which shields radiation from a radiation source by driving a plurality of aperture leaves, arranged in a thickness direction, a specific amount to limit an irradiation field to a desired range, the irradiation field limiting device comprising:

a flexible linear member secured to a thick portion of the aperture leaf; and

a driver section which drives the linear member.

2. The irradiation field limiting device according to claim 1,

wherein the driver section includes:

a base;

a drive shaft connected with a driving source through a connection portion and inserted into the base; and

a slider which moves along an axial direction of the drive shaft accompanying rotation of the drive shaft and is connected with the linear member.

3. The irradiation field limiting device according to claim 2,

wherein the connection portion includes a torque limiter section which limits transmission of torque equal to or greater than a specific torque.

4. The irradiation field limiting device according to claim 3,

wherein the connection portion includes a clutch mechanism which transmits a driving force to the drive shaft or disconnects the driving force from the drive shaft; and

wherein the irradiation field limiting device includes a control section which prevents the driving force from being transmitted to the drive shaft using the clutch mechanism when the torque limiter section has operated for a specific period of time.

5. The irradiation field limiting device according to claim 2,

wherein the connection portion includes a clutch mechanism which transmits a driving force to the drive shaft or disconnects the driving force from the drive shaft; and

wherein the irradiation field limiting device includes: a position detection section which detects a position of the aperture leaf; and a control section which prevents the driving force from being transmitted to the drive shaft using the clutch mechanism to stop movement of the aperture leaf when the position detection section has detected that the aperture leaf has moved to a target position.

6. The irradiation field limiting device according to claim 2, comprising:

a driving force transmission section which transmits a driving force of the driving source to a plurality of the drive shafts;

a plurality of clutch mechanisms which transmit the driving force to the drive shafts or disconnect the driving force from the drive shafts; and

a control section which can drive each of the aperture leaves by transmitting the driving force of the driving source in units of the drive shafts by controlling each of the clutch mechanisms.

7. The irradiation field limiting device according to claim 2,

wherein the slider has a female thread portion; and

wherein the drive shaft has a male thread portion which engages the female thread portion and moves the slider in the axial direction of the drive shaft by being rotated.

8. The irradiation field limiting device according to claim 1,

wherein the aperture leaf is fan-shaped or approximately rectangular.

9. The irradiation field limiting device according to claim 1,

wherein the linear member is a continuous metal wire, a wire rope formed by twisting the metal wires, or a hollow pipe.

10. The irradiation field limiting device according to claim 2, comprising:

a support shaft provided in the base and disposed approximately in parallel with the drive shaft at a specific interval from the drive shaft;

at least one guide which is supported on the support shaft so that the guide can move in an axial direction of the support shaft and maintains a shape of the linear member; and

an elastic member which is disposed between the guides and maintains an approximately identical interval between the guides.

11. The irradiation field limiting device according to claim 2, comprising:

an absolute position sensor which measures an absolute position of at least one of the aperture leaf and the slider; and

a high-resolution relative position sensor which measures an amount of movement from a specific position of at least one of the aperture leaf and the slider measured using the absolute position sensor.

12. The irradiation field limiting device according to claim 1,

wherein the aperture leaves are arranged in a thickness direction so that the aperture leaves can freely move through

rolling elements; and

wherein a side surface of the aperture leaf protrudes in the thickness direction to form a holding portion which holds the rolling element.

13. The irradiation field limiting device according to claim 12,

wherein the holding portion forms at least one of a straight line and a curve to hold the rolling element.

14. The irradiation field limiting device according to claim 12,

wherein one of the adjacent rolling elements provided on either side of the aperture leaf is disposed at a position close to the radiation source, and the other is disposed at a position away from the radiation source.

15. The irradiation field limiting device according to claim 12,

wherein the holding portions are disposed at different positions with respect to the irradiation direction, and are repeatedly disposed at an identical position in units of a specific number of the aperture leaves.

16. The irradiation field limiting device according to claim 12,

wherein the holding portion is a shielding portion which

prevents radiation from passing through a space between the aperture leaves adjacent to each other.

17. The irradiation field limiting device according to claim 1, comprising a shielding portion which shields radiation in an opening between the aperture leaves adjacent to each other.

18. The irradiation field limiting device according to claim 1,

wherein the linear members respectively secured to the aperture leaves adjacent in the thickness direction differ in axial direction.

19. The irradiation field limiting device according to claim 18,

wherein the driver section drives the aperture leaf of which the axial direction of the linear member is set to be identical in units of a specific number of the linear members.

20. The irradiation field limiting device according to claim 1,

wherein the linear members respectively secured to the aperture leaves adjacent in the thickness direction differ in axial direction and are identical in axial direction in units of a specific number of the linear members; and

wherein the irradiation field limiting device includes a

plurality of driver units each of which includes a plurality of the driver sections which respectively drive the linear members of which the axial directions are set to be identical in units of a specific number of the linear members.

21. The irradiation field limiting device according to claim 1, comprising:

a linear member holding portion which holds the linear member between the aperture leaf and the driver section so that the linear member can move in the axial direction to prevent the linear member from buckling.

22. The irradiation field limiting device according to claim 1,

wherein the linear member drives the aperture leaf while contacting the thick portion, is preliminarily bent in a direction away from a contact portion between the linear member and the thick portion, and presses a portion in contact with the thick portion so that the linear member is prevented from buckling.